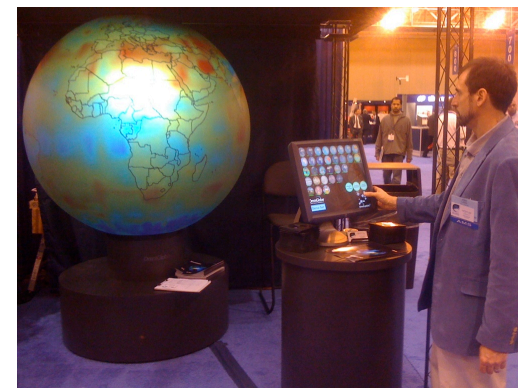




# AIRS Outreach

## Science Team Meeting Oct 2008 - Sharon Ray



*AMS New Orleans  
Climate Day Los Angeles  
JPL Open House*



# The New AIRS Web Site

*Launched 9/29/08*

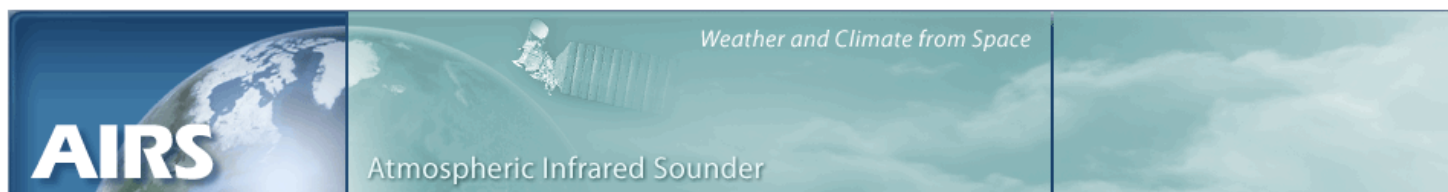
Check out the new AIRS web site at [airs.jpl.nasa.gov](http://airs.jpl.nasa.gov)



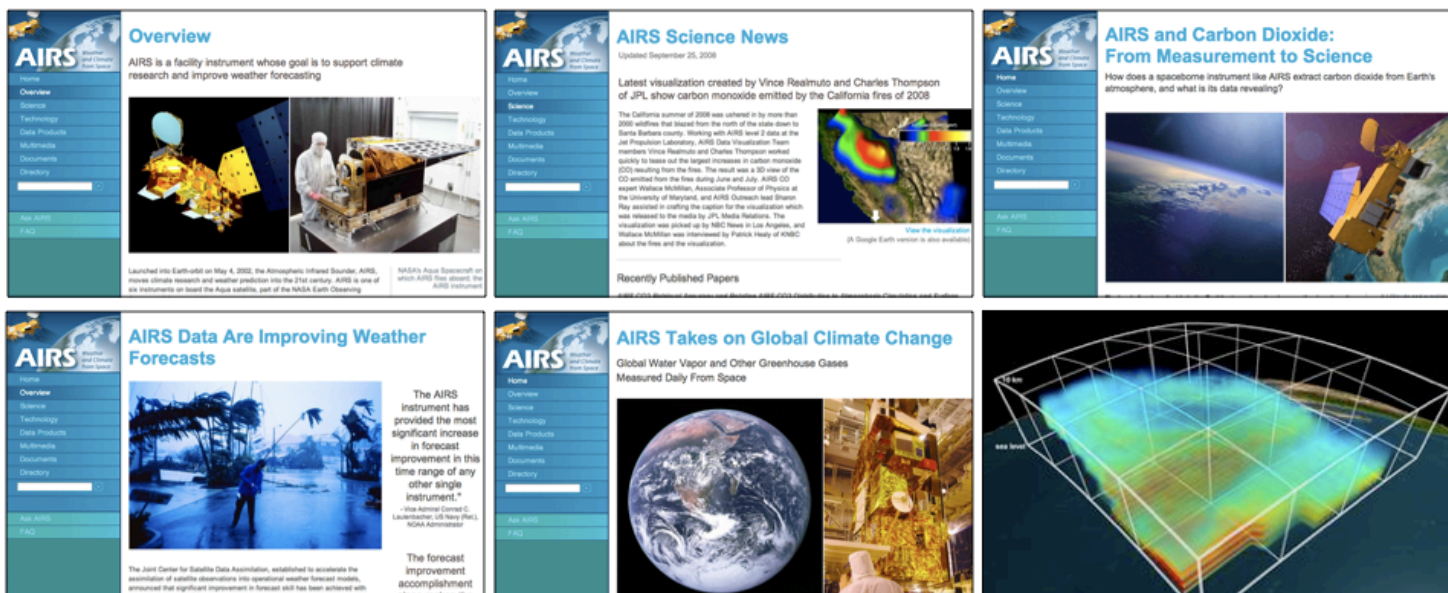
The screenshot displays the AIRS web site interface. At the top, the NASA logo and Jet Propulsion Laboratory California Institute of Technology name are visible, along with navigation links for JPL HOME, EARTH, SOLAR SYSTEM, STARS & GALAXIES, and SCIENCE & TECHNOLOGY. Below this, a banner reads "Weather and Climate from Space" and "Atmospheric Infrared Sounder". The main content area features a "Press Release: New Maps of CO2" with a large image of Earth showing CO2 distribution. To the right, a "HEADLINES" section lists recent news items, including "New Maps of CO2" and "Science Meeting Oct 14-17". Below the main content, there are sections for "Maps in Motion" showing various atmospheric data maps (Water Vapor, Carbon Monoxide, Temperature) and a "Satellite Feed" showing a map of the Earth with satellite coverage. The footer includes the USA.gov logo, navigation links for DATA USERS NEWS, OUTREACH, FOR PRESS, PRIVACY, and CONTACT, and contact information for the site manager and webmaster.



# The New AIRS Web Site



News, data, animations, information — The Atmospheric Infrared Sounder on NASA's Aqua satellite is making a difference in the science of Earth's weather and climate



"The AIRS instrument has provided the most significant increase in forecast improvement in this time range of any other single instrument."

- Vice Admiral Conrad C. Lautenbacher, US Navy (Ret.), NOAA Administrator

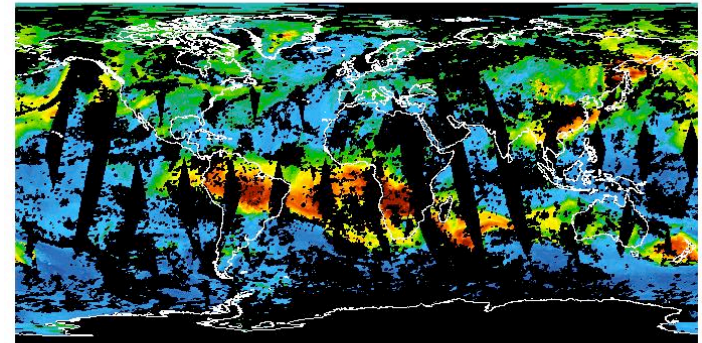
"The [weather] forecast improvement accomplishment alone makes the AIRS project well worth the American taxpayers investment"

- Dr. Mary Cleave, associate administrator of NASA's Science Mission Directorate

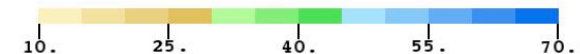
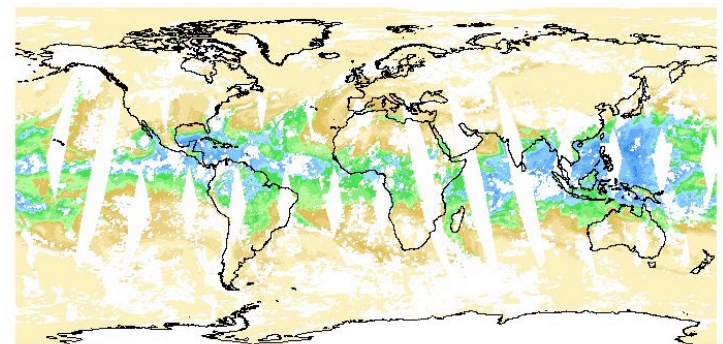
# The New AIRS Web Site

- Serving the Public & the Science Communities
  - Overviews, Stories, Maps, Rapid Reponse, Multimedia
  - Major Findings, Papers, Extensive Data Information, AskAIRS, FAQ
- New Organization
  - Easy access
  - Get imagery the way you want it. Organized by: geophysical data product, natural hazard, visualizations, animations, video
- New Look
  - Lots of visuals with links to NASA databases
- New Features
  - **Maps In Motion:** archive of the “pretty version” of 10 data products from the beginning of the mission
  - **Maps from Satellite Feed coming soon:** daily images of 6 data products. Image is zeroed out at night, builds up during the day as granules come in
  - Science News
  - FAQ
  - Publications Database
- Efficient Image Archive Strategy
- Fast updates
  - iWeb development environment

AIRS CO AT 505mb (ppbv) 20081010



AIRS TOTAL PRECIPITABLE WATER VAPOR (millimeters) 20081010





## The New AIRS Web Site *More content please*

- Papers
  - Publications Database
  - possible web feature (home page headline)
- Feature stories
  - Home page headline
  - Could feed to the Global Climate Change web site
- Science News
  - informal, to highlight an image, field campaign, anything
  - latest papers
- Video
  - build up our scientist interviews gallery
- Multimedia Gallery
  - add your image/movie/plot

### Teasing out Carbon Dioxide From Earth's Atmosphere: An interview with Cyril Crevoisier

Cyril Crevoisier of France's National Center for Scientific Research talks about the challenges of retrieving atmospheric CO<sub>2</sub> and his effort to find its sources and sinks

My name is Cyril Crevoisier. I was formerly a Ph.D. student in Paris at the [Laboratoire de Météorologie Dynamique](#) working with Alan Chedin, and we were working on CO<sub>2</sub> retrievals from AIRS observations. Since October 2004 I've been doing a post-doc at Princeton University, estimating carbon sources and sinks at Earth's surface.

I'm now working with Alan Chedin and Noelle Scott of the [Laboratoire de Météorologie Dynamique](#). They have been involved in using satellite observations for about 20 or 30 years now and so have very good knowledge of all these instruments. They began looking at TOVS [data for] observations of CO<sub>2</sub>. The TOVS instruments were first launched in 1972 and are still operating now, but they have very small spectral resolution which means we cannot really extract all the information about different species – CO<sub>2</sub>, methane, etc. Whereas with AIRS, the spectral resolution has really increased so we have a lot more information about CO<sub>2</sub>.



Dr. Cyril Crevoisier

Cyril Corvouisier  
Andrew Dessler  
Larrabee Strow  
Mitch Goldberg  
Walter Wolff

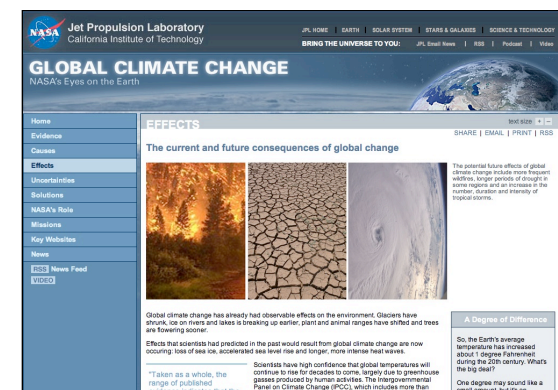
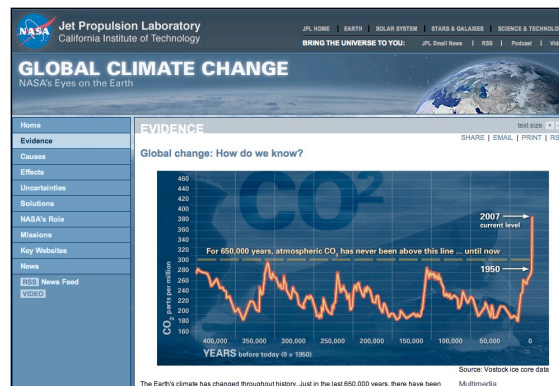
David Neilan  
Chris Barnett  
Mous Chahine  
Andrew Gettleman  
Laura Pan

# Global Climate Change Web Site

*Launched June 15, 2008*



- 1.2 million hits/99,000 page views in first two weeks
- Already a top 10 Google search result for 'Global Climate Change'
- Earth Vital Signs Widget: Number 9 out of over 3,700 widgets on Apple.com
- Solid following on Twitter

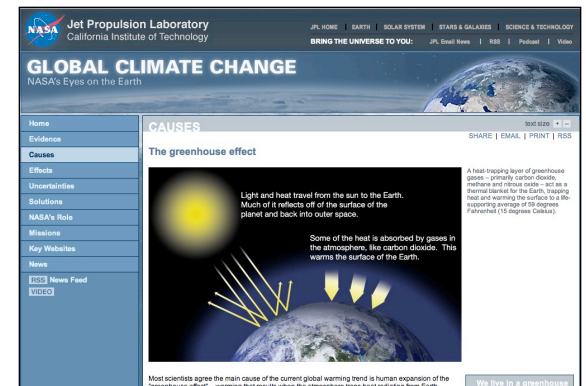
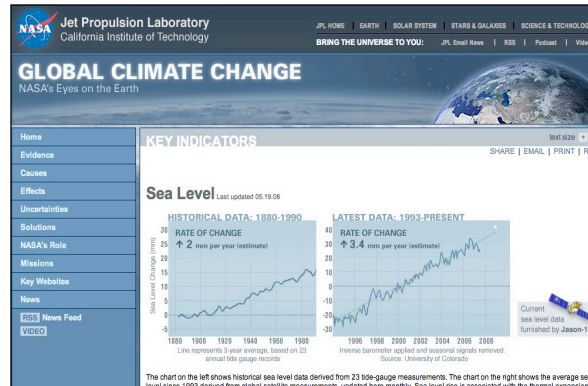
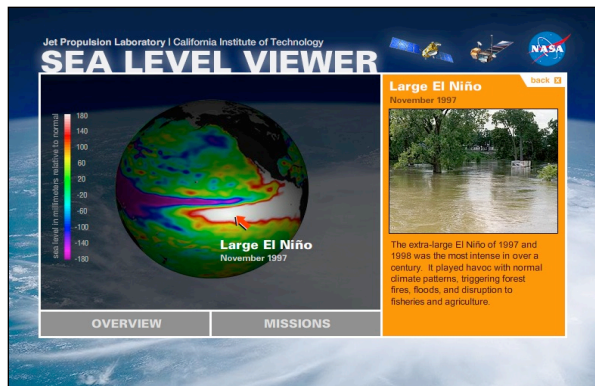
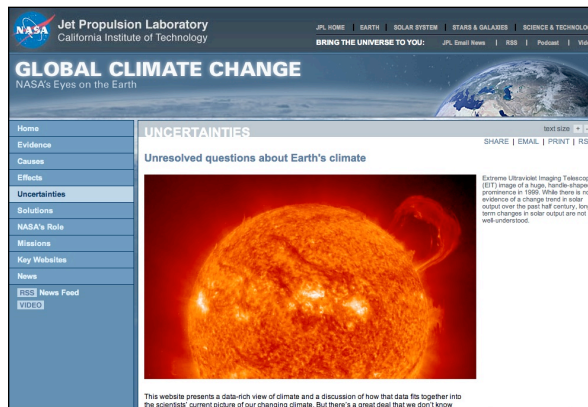
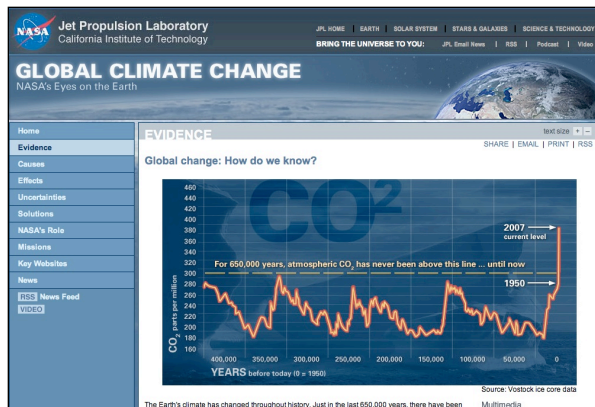


<http://climate.jpl.nasa.gov>



# A Focus on Visual Elements

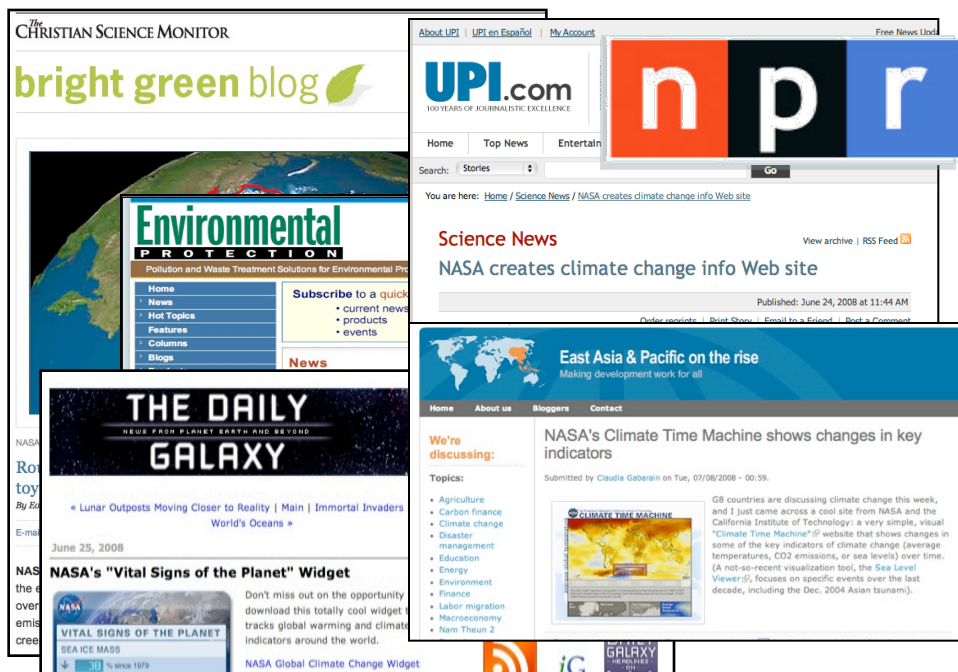
News...key climate change indicators...interactives...  
videos...NASA's role in climate science research





# Strong Reviews from Media, Web Pundits, and Users

Dozens of articles; 300+ blog postings



I plan to have it a classroom staple.  
**–J.R.Waring, Earth science teacher**

The “Climate Time Machine” .... will knock your socks off.  
**–Greg Laden, Science and Engineers for America**

Reaching into the Web 2.0 World



Earth Vital Signs Widget:  
 Number 9  
 out of over 3,700 widgets  
 on Apple.com



A solid  
 following on  
 Twitter



# Target Outlets

- The Web
  - AIRS, Global Climate Change, JPL Home, Earth Observatory, NASA Home, NASA Earth
  - Discovery EarthLive, Google Earth
  - Wikipedia
- Print
  - Weatherwise
- Radio
- Broadcast
  - Event-driven visualizations for News outlets
  - CO visualization on KNBC
  - AIRS hurricane image on Fox News





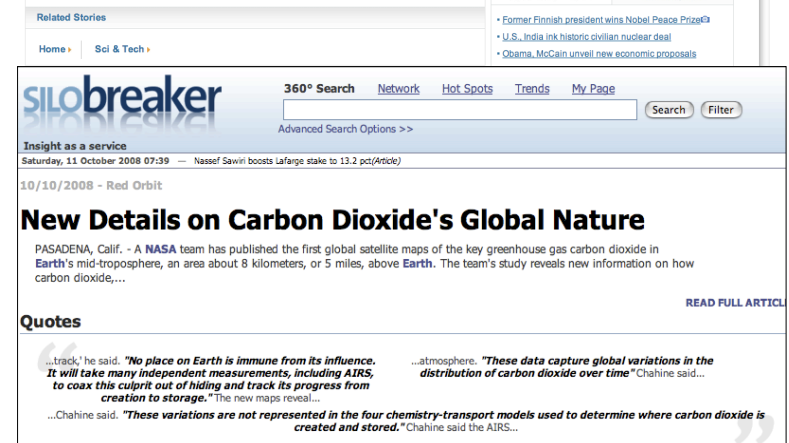
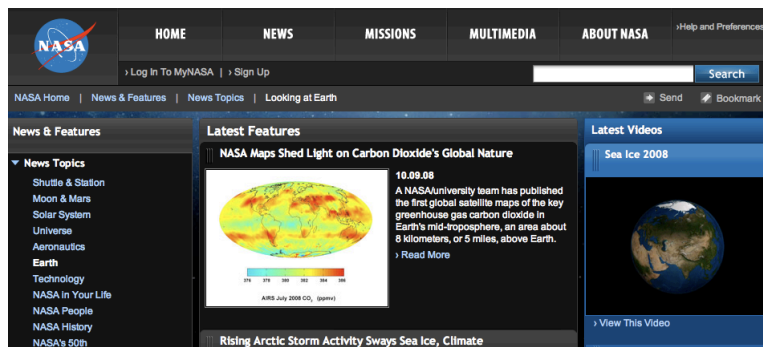
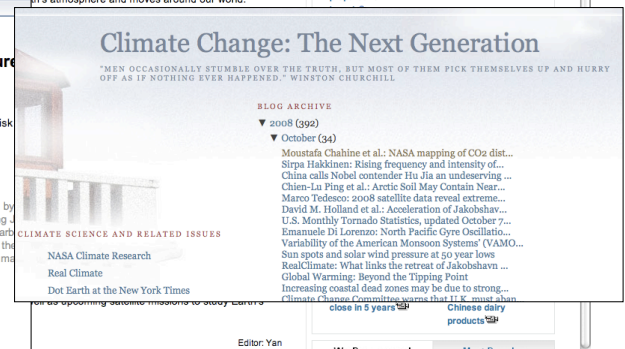
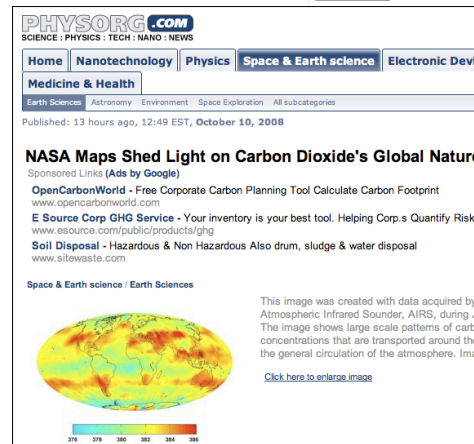
# News Release: NASA Maps Shed Insights Into Its Global Nature

• Issued October 9

Chahine, M. T., L. Chen, P. Dimotakis, X. Jiang, Q. Li, E. T. Olsen, T. Pagano, J. Randerson, and Y. L. Yung (2008), **Satellite remote sounding of mid-tropospheric CO<sub>2</sub>**, Geophys. Res. Lett., 35, L17807, <http://dx.doi.org/10.1029/2008GL035022> 9 September 2008

October 09, 2008 PASADENA, Calif.

- A NASA/university team has published the first global satellite maps of the key greenhouse gas carbon dioxide in Earth's mid-troposphere, an area about 8 kilometers, or 5 miles, above Earth. The team's study reveals new information on how carbon dioxide, which directly contributes to climate change, is distributed in Earth's atmosphere and moves around our world.







Jet Propulsion Laboratory  
California Institute of Technology

# Web Stats

## September 2008

**3,644 visits came from 105 countries/territories**

Detail Level: [City](#) | [Country/Territory](#) | [Sub-Continent Region](#) | [Continent](#) Dimension: [None](#)

**Site Usage** **Goal Conversion**

Visits **3,644** Pages/Visit **3.20** Avg. Time on Site **00:02:22**  
% of Site Total: 100.00% Site Avg: 3.20 (0.00%) Site Avg: 00:02:22

Detail Level: [Country/Territory](#)

1.	<a href="#">United States</a>	<b>3,644 Visits</b>
2.	<a href="#">United Kingdom</a>	<b>2,975 Absolute Unique Visitors</b>
3.	<a href="#">Japan</a>	<b>11,668 Pageviews</b>
4.	<a href="#">Canada</a>	<b>3.20 Average Pageviews</b>
5.	<a href="#">India</a>	<b>00:02:22 Time on Site</b>
6.	<a href="#">Germany</a>	<b>52.09% Bounce Rate</b>
7.	<a href="#">Australia</a>	<b>78.13% New Visits</b>
8.	<a href="#">France</a>	
9.	<a href="#">China</a>	
10.	<a href="#">Mexico</a>	

Page	Visits <b>3,644</b> % of Site Total: 100.00%	Pages <b>3.20</b> Site Avg
1. <a href="#">/</a>	<b>Source/Medium</b>	
2. <a href="#">/Data/</a>	1. <a href="#">google / organic</a>	
3. <a href="#">/Data/DailyMaps/</a>	2. <a href="#">(direct) / (none)</a>	
4. <a href="#">/News/Events/</a>	3. <a href="#">yahoo / organic</a>	
5. <a href="#">/Products/</a>	4. <a href="#">search.nasa.gov / referral</a>	
6. <a href="#">/WeatherSnapshots/HurricaneGustav/</a>	5. <a href="#">climate.jpl.nasa.gov / referral</a>	
7. <a href="#">/Data/GetAIRSdata/</a>	6. <a href="#">search.jpl.nasa.gov:8080 / referral</a>	
8. <a href="#">/Science/</a>	7. <a href="#">photojournal.jpl.nasa.gov / referral</a>	
9. <a href="#">/Products/CarbonDioxide/</a>	8. <a href="#">jpl.nasa.gov / referral</a>	
10. <a href="#">/Mission/</a>	9. <a href="#">images.google.com / referral</a>	
	10. <a href="#">nasa.gov / referral</a>	

## October 1-12, 2008

Visits **7,672**  
% of Site Total: 100.00%

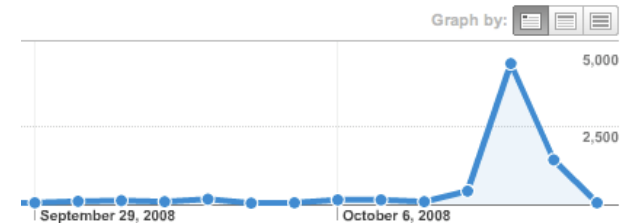
Detail Level: [Country/Territory](#)

1.	<a href="#">Italy</a>
2.	<a href="#">United States</a>
3.	<a href="#">United Kingdom</a>
4.	<a href="#">Germany</a>
5.	<a href="#">France</a>
6.	<a href="#">Canada</a>
7.	<a href="#">Switzerland</a>
8.	<a href="#">Spain</a>
9.	<a href="#">Japan</a>
10.	<a href="#">Netherlands</a>

Page
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2. <a href="#">/</a>
3. <a href="#">/meetings/science-team-greenbelt/</a>
4. <a href="#">/maps/maps_in_motion/</a>
5. <a href="#">/overview/overview/</a>
6. <a href="#">/science/news/</a>
7. <a href="#">/multimedia/geophysical_products_multimedia/carbon_dioxide/</a>
8. <a href="#">/data_products/data_product_descriptions/</a>
9. <a href="#">/story_archive/Measuring_CO2_from_Space/Measurement_to_Science/</a>
10. <a href="#">/multimedia/geophysical_products_multimedia/</a>

## • News Release Issued October 9

Sep 1, 2008 - Oct 12, 2008



**7,672 Visits**  
**7,122 Absolute Unique Visitors**  
**14,067 Pageviews**  
**1.83 Average Pageviews**  
**00:01:11 Time on Site**  
**72.73% Bounce Rate**  
**90.92% New Visits**

Sources
<a href="#">corriere.it (referral)</a>
<a href="#">(direct) ((none))</a>
<a href="#">google (organic)</a>
<a href="#">climate.jpl.nasa.gov (referral)</a>
<a href="#">nasa.gov (referral)</a>

### *As of October 12*

- Google Search Terms
  - carbon dioxide: 19th
  - carbon dioxide map: 4th; 3 of the first 10
  - carbon dioxide map - images: 7th, 9th of 449k results
- Yahoo Search Terms
  - carbon dioxide: -
  - carbon dioxide map: 3rd, 4th of 16.5 million results
  - carbon dioxide map - images: 24th of 504 results
- Cited on 184 blogs



# Hurricane Rapid Response

- AIRS supplied 41 of the 60 images used by the NASA Hurricane portal so far during the 2008 Hurricane Season
- NASA Hurricane Page - almost half a million visitors in September
  - The NASA Hurricane page pulled in 495,979 hits in the month of September (per Rob Garner, NASA Goddard web master)

**Hurricanes**  
Latest Storm Images and Data From NASA

**Featured Images**

Text Size: [ + - ] Rate me: ☆☆☆☆☆

**Hurricane Season 2008: Tropical Cyclone Higos (Pacific Ocean)**

Oct. 3, 2008

Tropical Depression Higos Looking at Landfall on the China Coast

The Joint Typhoon Warning Center said in their statement on October 3, "[Tropical Depression] Higos is expected to maintain intensity as a weak tropical depression under marginally favorable conditions as the system steers towards Hainan Island and the southern Chinese coast. [Higos] will begin dissipating once making landfall on the Chinese mainland by [October 4]."

On Oct. 3, Tropical Depression Higos had sustained winds near 25 knots (28 mph) and was moving over Hainan Island, headed to mainland China. It was located near 19.3 degrees north latitude and 110.9 east longitude.

The image was created by data from the Atmospheric Infrared Sounder (AIRS), an instrument that flies aboard NASA's Aqua satellite. The image was taken on Oct. 3 at 5:41 UTC (1:41 a.m. EDT). The infrared image shows a huge temperature difference between the tops of the clouds in a tropical cyclone and the warm ocean waters that power it.

Credit: NASA/JPL  
> Larger image

**AIRS** Weather and Climate from Space

**Weather Snapshot: Hurricane Norbert** October 9, 2008

**Quick Stats**

EASTERN PACIFIC  
Hurricane NORBERT  
Category 1  
Location  
410 miles SSW of Cabo San Lucas  
Movement  
NW at 6 knots  
Maximum sustained winds  
110 knots  
Norbert is expected to veer northeast and impact the southern Baja California peninsula early on Saturday.

**Related Links**

NASA Hurricane Portal  
National Hurricane Center  
Unleash Hurricane/Typhoon  
Tropical Cyclone Advisory Summary  
Tropical Storm Risk  
Hurricane Forecasts  
NRL Tropical Cyclone Page  
Upper Ocean Heat Content & Tropical Cyclone Heat Potential  
Storm Banner  
Japan Meteorological Agency  
Jet Stream Map

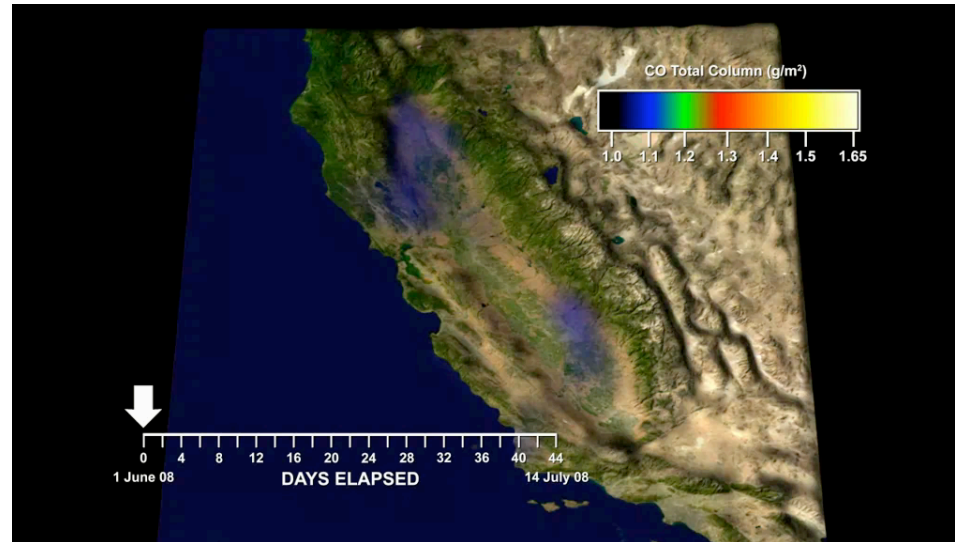
**Hurricane Norbert**

These infrared, microwave, and visible images were created with data retrieved by the Atmospheric Infrared Sounder (AIRS) on NASA's Aqua satellite.

From the National Weather Service:  
HURRICANE NORBERT ADVISORY NUMBER 24  
NWS TPCNATIONAL HURRICANE CENTER MIAMI FL EP152008  
200 PM PDT THU OCT 09 2008

...NORBERT CONTINUES TO WEAKEN AS IT MOVES CLOSER TO BAJA CALIFORNIA...  
AT 200 PM PDT, 2100Z, THE CENTER OF HURRICANE NORBERT WAS LOCATED NEAR LATITUDE 18.3 NORTH, LONGITUDE 112.9 WEST OR ABOUT 370 MILES, 600 KM, SOUTH-SOUTHWEST OF THE SOUTHERN TIP OF BAJA CALIFORNIA.

## New Visualization



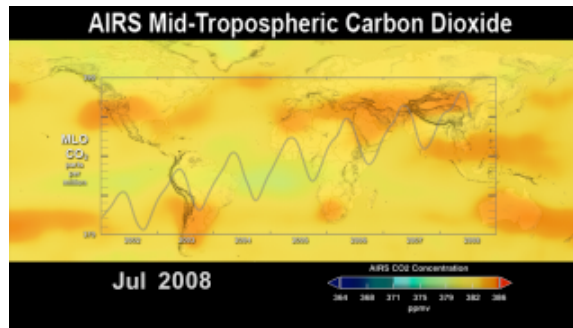
### Carbon Monoxide from California's Wildfires

Visualization of the rapid increases in carbon monoxide (CO) emitted by fires burning in California in June and July 2008. Only the largest values of CO detected by AIRS are shown to highlight the impact of the fires. AIRS primarily observes CO in a layer from 2 to 7 kilometers above Earth's surface. Thus, it tends to see where the wind blows the carbon monoxide and not just the smoke directly above the fires. However, many of these intense fires lofted a significant amount of carbon monoxide directly above the fires, making the hotspots also visible to AIRS.

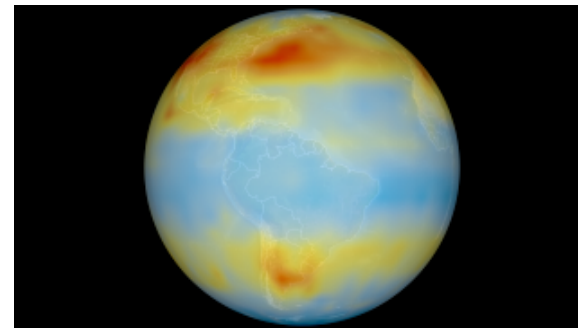


Jet Propulsion Laboratory  
California Institute of Technology

## New Visualization



CO2 with Mauna Loa Data Overlaid

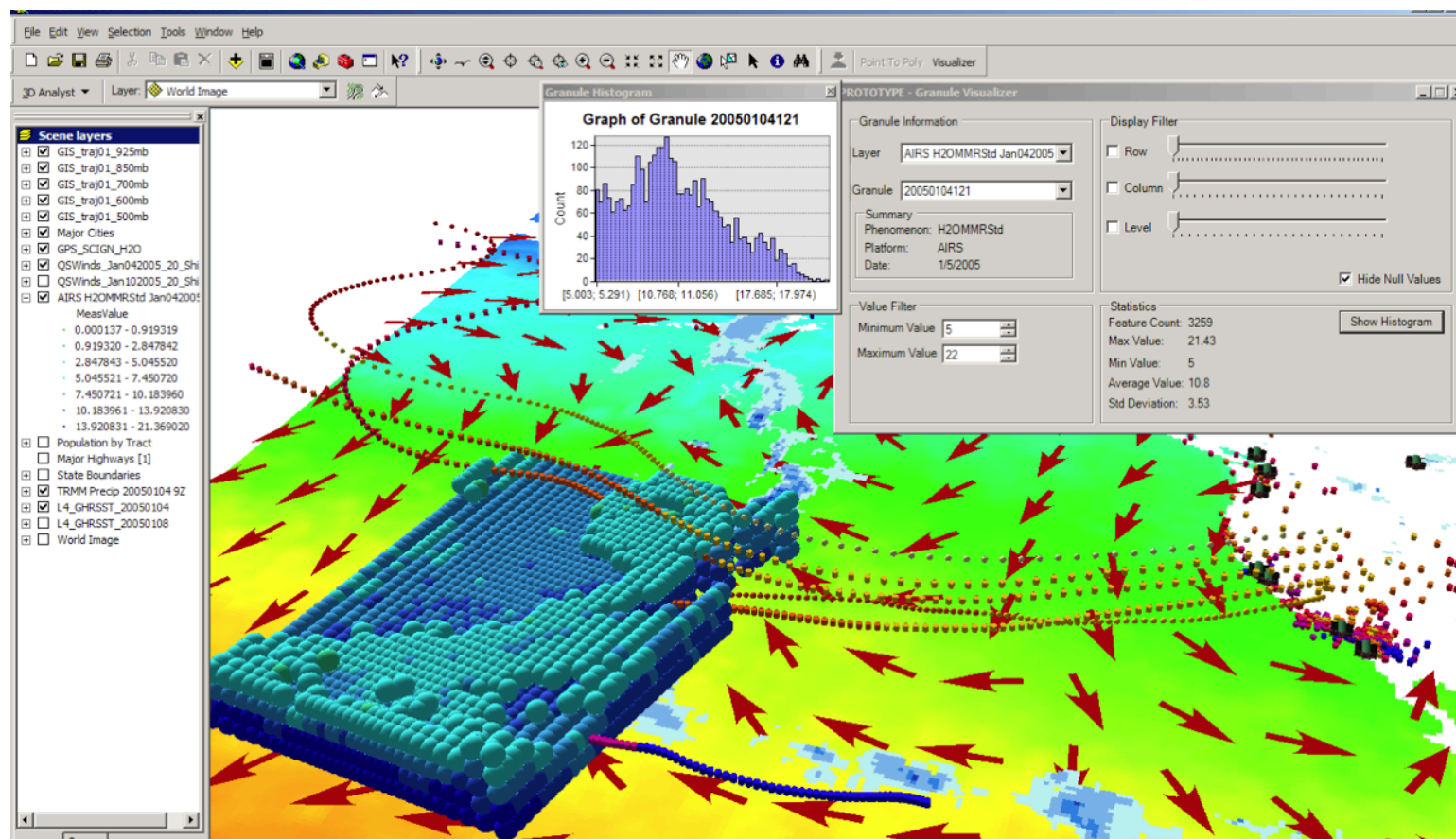


AIRS Sees Belt of CO2 in Southern Hemisphere, July 2003

- Created by Lori Perkins, GSFC SVS

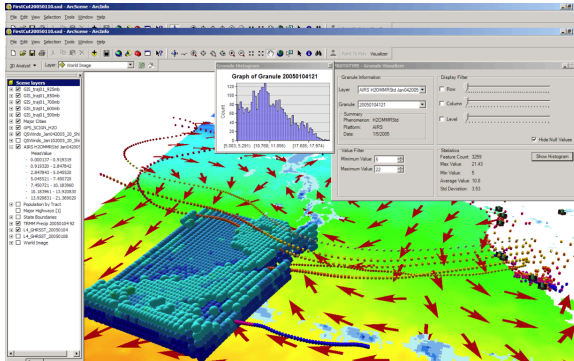


## New Visualization



Three-Dimensional View Of Water Vapor Transport Along A Pacific Basin Atmospheric River, January 4, 2005

## New Visualization



### Three-Dimensional View Of Water Vapor Transport Along A Pacific Basin Atmospheric River, January 4, 2005

The development of a plug-in prototype GIS tool had, as a science driver, a case study examining the role of water vapor transport along an atmospheric river across the Pacific Basin in January 2005. During this time period an extreme precipitation event was produced. This event caused significant amounts of rain to fall over much of California, triggering mudslides that resulted in millions of dollars of damage and a dozen deaths.

The study characterized the three-dimensional distribution of water vapor during the event and related surface winds and height-resolved water vapor to coastal rainfall. Measurements were supplied by a host of spaceborne instruments and one ground-based instruments. These measurements consisted of: water vapor from the AIRS instrument, surface winds from QuikSCAT, precipitation from TRMM, sea surface temperature from GHRST, and integrated water vapor from SCIGN ground-based GPS. Back-in-time trajectories were provided by HYSPLIT.

In this figure, a granule of AIRS water vapor data was subsetting to show the points with highest values of water vapor in the northeastern Pacific. These measurements are shown as a point cloud superimposed on a background of GHRST sea surface temperatures, TRMM precipitation, and QuikSCAT wind vectors.

To the right of the image, water vapor amounts from the SCIGN GPS network are shown color-coded by absolute magnitude for various stations. Back trajectories from the NOAA HYSPLIT model are shown as dotted lines, indicating the relationship between the atmospheric water vapor over the Pacific and water vapor over land. A histogram of the AIRS data values is also shown in the top center of the image.

# Carbon Markets Insights Conference



"Point Carbon is a world-leading provider of independent news, analysis and consulting services for European and global power, gas and carbon markets."

"...the number one supplier of unrivaled market intelligence of these markets."

"Our staff includes experts in international and regional climate policy, mathematical and economic modeling, forecasting methodologies, risk management and market reporting."

- **New Audience**
  - Congressional staffers, venture capitalists, policy makers
- **Objective**
  - Convey that JPL is a leader in the remote sensing of CO<sub>2</sub>
  - unbiased, global data that is free
  - introduce existing data (AIRS) and new missions (OCO & Ascends)
- **AIRS & OCO presence, booth**
  - Staffed by Tom Pagano & Sharon Ray (AIRS), Stacey Boland OCO



## Book: Atmospheric Science at NASA - A History

- Chronicles the history of atmospheric science at NASA

-traces the story from its beginnings in 1958, the International Geophysical Year, through to the present, focusing on NASA's programs and research in meteorology, stratospheric ozone depletion, and planetary climates and global warming. But the story is not only a scientific one.

- NASA's researchers operated within an often politically contentious environment. Although environmental issues garnered strong public and political support in the 1970s, the following decades saw increased opposition to environmentalism as a threat to free market capitalism.

- Critically examines this politically controversial science

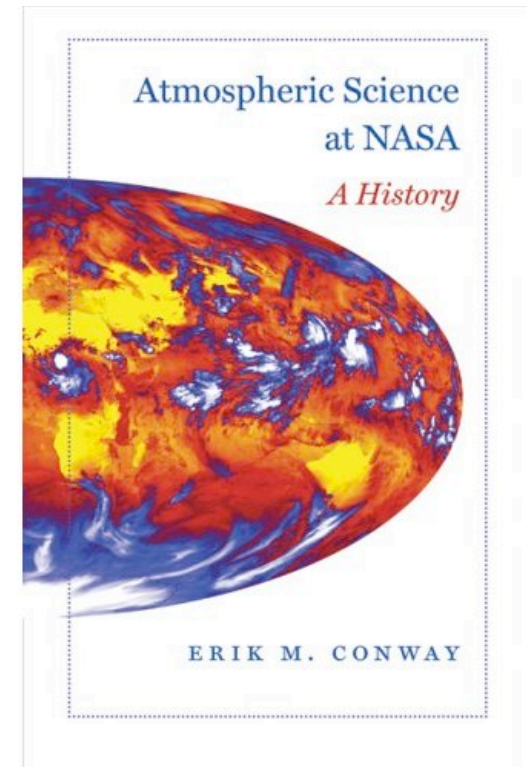
- Dissects the often convoluted roles, motives, and relationships of the various institutional actors involved -- among them NASA, congressional appropriation committees, government weather and climate bureaus, and the military.

---

"The author does an excellent job of telling this story -- translating the science into prose, characterizing the various personalities and institutions, organizing the convoluted tale into a narrative, and assessing interactions of multifarious factors. The work... will stand as a significant contribution to the literature. Much of the story has not yet been told, or if it has, certainly not in this detail or scope. It is likely to rank high in the top score or so of books

devoted to the history of space science."

-- *Joseph N. Tatarewicz, University of Maryland, Baltimore County*



Johns Hopkins University Press  
[http://www.press.jhu.edu/books/title\\_pages/9567.html](http://www.press.jhu.edu/books/title_pages/9567.html)